

**Amendments to the Claims:**

This listing of claims will replace all prior versions, and listings, of claims in the application:

**Listing of Claims:**

Claims 1-154 (Canceled)

Claim 155. (New): A method of increasing the functionality of the bone marrow of a patient, comprising disrupting sex steroid-mediated signaling in the patient, wherein the bone marrow functionality is increased without reactivation of the patient's thymus.

Claim 156. (New): The method of claim 155, wherein hematopoietic stem cell (HSC) hemopoiesis is increased.

Claim 157. (New): The method of claim 155, wherein HSC output from the bone marrow is increased.

Claim 158. (New): The method of claim 155, wherein the sex steroid-mediated signaling is disrupted by surgical castration or chemical castration.

Claim 159. (New): The method of claim 155, wherein the sex steroid-mediated signaling is disrupted by administration of a pharmaceutical.

Claim 160. (New): The method of claim 159, wherein the pharmaceutical is selected from the group consisting of an LHRH agonist, an LHRH antagonist, an anti-LHRH vaccine, an anti-androgen, an anti-estrogen, a SERM, a SARM, a SPRM, an ERD, an

aromatase inhibitor, an anti-progestogen, a progestin, an anti-progestin, an adrenal gland blocker, an aldosterone antagonist, a dioxalan derivative, and combinations thereof.

Claim 161. (New): The method of claim 160, wherein the LHRH agonist is selected from the group consisting of Goserelin, Leuprolide, Triptorelin, Meterelin, Buserelin, Histrelin, Nafarelin, Lutrelin, Leuprorelin, Deslorelin, Cystorelin, Decapeptyl, Gonadorelin, and combinations thereof.

Claim 162. (New): The method of claim 160, wherein the LHRH antagonist is selected from the group consisting of Abarelix, Cetrorelix, acetates, citrates, and other salts thereof, and combinations thereof.

Claim 163. (New): The method of claim 160, wherein the anti-androgen is selected from the group consisting of Cosudex®, bicalutamide, cyproterone acetate, liarozole, ketoconazole, flutamide, megestrol acetate, dutasteride, finasteride, Eulexin, and combinations thereof.

Claim 164. (New): The method of claim 155, wherein the thymus of the patient is at least in part atrophied.

Claim 165. (New): The method of claim 164, wherein the patient has a disease or illness that at least in part atrophied the thymus of the patient.

Claim 166. (New): The method of claim 164, wherein the patient has been treated for a disease or illness that at least in part atrophied the thymus of the patient.

Claim 167. (New): The method of claim 166, wherein the treatment is immunosuppression, chemotherapy, or radiation treatment.

Claim 168. (New): The method of claim 164, wherein the patient is post-pubertal.

Claim 169. (New): The method of claim 168, further comprising administering cells to the patient, wherein the cells are stem cells, progenitor cells, dendritic cells, or combinations thereof.

Claim 170. (New): The method of claim 169, wherein the stem cells are selected from the group consisting of HSC, epithelial stem cells, and combinations thereof.

Claim 171. (New): The method of claim 169, wherein the progenitor cells are selected from the group consisting of lymphoid progenitor cells, myeloid progenitor cells, and combinations thereof.

Claim 172. (New): The method of claim 169, wherein the cells are HSC.

Claim 173. (New): The method of claim 172, wherein the HSC are CD34<sup>+</sup>.

Claim 174. (New): The method of claim 169, wherein the cells are autologous.

Claim 175. (New): The method of claim 169, wherein the cells are not autologous.

Claim 176. (New): The method of claim 173, wherein the HSC are administered at the time disruption of sex steroid-mediated signaling is begun.

Claim 177. (New): A method for treating or diminishing the risk of a disease or illness in a patient in need thereof without thymus reactivation, comprising:

disrupting sex steroid-mediated signaling in the patient;  
administering HSC to the patient; and  
allowing HSC engraftment in the patient's bone marrow,  
wherein the HSC engraftment is enhanced without thymus reactivation.

Claim 178. (New): The method of claim 177, wherein the disease or illness is caused by an agent selected from the group consisting of viruses, bacteria, fungi, parasites, prions, allergens, asthma-inducing agents, and self proteins and antigens that cause autoimmune disease.

Claim 179. (New): The method of claim 178, wherein the agent is a virus.

Claim 180. (New): The method of claim 179, wherein the virus is selected from the group consisting of Retroviridae, Picornaviridae, Calciviridae, Togaviridae, Flaviridae, Coronaviridae, Rhabdoviridae, Filoviridae, Paramyxoviridae, Orthomyxoviridae, Bungaviridae, Arenaviridae, Reoviridae, Birnaviridae, Hepadnaviridae, Parvoviridae, Papovaviridae, Adenoviridae, Herpesviridae, Poxviridae, and Iridoviridae.

Claim 181. (New): The method of claim 179, wherein the virus is selected from the group consisting of influenza virus, human immunodeficiency virus, and herpes simplex virus.

Claim 182. (New): The method of claim 178, wherein the agent is a bacterium.

Claim 183. (New): The method of claim 182, wherein the bacterium is selected from the group consisting of *Helicobacter pylori*, *Borelia burgdorferi*, *Legionella pneumophila*, *Mycobacterium tuberculosis*, *Mycobacterium avium*, *Mycobacterium intracellulare*, *Mycobacterium kansaii*, *Mycobacterium gordonae*, *Mycobacteria* sporozoites, *Staphylococcus aureus*, *Neisseria gonorrhoeae*, *Neisseria meningitidis*, *Listeria monocytogenes*, *Streptococcus pyogenes*, *Streptococcus agalactiae*, *Streptococcus faecalis*, *Streptococcus bovis*, *Streptococcus pneumoniae*, pathogenic *Campylobacter* sporozoites, *Enterococcus* sporozoites, *Haemophilus influenzae*, *Bacillus anthracis*, *Corynebacterium diphtheriae*, *Corynebacterium* sporozoites, *Erysipelothrix rhusiopathiae*, *Clostridium perfringens*, *Clostridium tetani*, *Enterobacter aerogenes*, *Klebsiella pneumoniae*, *Pasturella multocida*, *Bacteroides* sporozoites, *Fusobacterium nucleatum*, *Streptobacillus moniliformis*, *Treponema pallidum*, *Treponema pertenuis*, *Leptospira*, and *Actinomyces israelii*.

Claim 184. (New): The method of claim 182, wherein the bacterium is a mycobacterium.

Claim 185. (New): The method of claim 178, wherein the agent is a parasite.

Claim 186. (New): The method of claim 185, wherein the parasite is selected from the group consisting of *Plasmodium falciparum*, *Plasmodium yoelli*, and *Toxoplasma gondii*.

Claim 187. (New): The method of claim 178, wherein the agent is an infectious fungus.

Claim 188. (New): The method of claim 187, wherein the infectious fungus is selected from the group consisting of *Cryptococcus neoformans*, *Histoplasma capsulatum*, *Coccidioides immitis*, *Blastomyces dermatitidis*, *Chlamydia trachomatis*, and *Candida albicans*.

Claim 189. (New): The method of claim 177, wherein the illness or disease is a cancer.

Claim 190. (New): The method of claim 189, wherein the cancer is selected from the group consisting of a cancer of the brain, a cancer of the lung, a cancer of the ovary, a cancer of the breast, a cancer of the prostate, a cancer of the colon, a cancer of the blood, a cancer of the cervix, a cancer of the uterus, a cancer of the endometrium, a cancer of the bladder, a cancer of the renal organs, a cancer of the gastro-intestinal tract, a cancer of the bone, a cancer of the skin, a cancer of the connective tissue, a carcinoma, a melanoma, and a sarcoma.

Claim 191. (New): The method of claim 178, wherein the agent is an allergen.

Claim 192. (New): The method of claim 191, wherein the allergen causes an allergic condition selected from the group consisting of eczema, allergic rhinitis, allergic coryza, hay fever, bronchial asthma, urticaria (hives), and food allergies.

Claim 193. (New): The method of claim 178, wherein the patient was exposed to the agent prior to the disruption of sex steroid-mediated signaling in the patient.

Claim 194. (New): The method of claim 178, wherein the patient was not exposed to the agent prior to the disruption of sex steroid-mediated signaling in the patient.

Claim 195. (New): The method of claim 177, further comprising administering to the patient a substance selected from the group consisting of a cytokine, a hematopoietin, a lymphokine, an interleukin, a CSF, a growth factor, and a combination thereof.

Claim 196. (New): The method of claim 195, wherein the cytokine is selected from the group consisting of Interleukin 1 (IL-1), Interleukin 2 (IL-2), Interleukin 3 (IL-3), Interleukin 4 (IL-4), Interleukin 5 (IL-5), Interleukin 6 (IL-6), Interleukin 7 (IL-7), Interleukin 8 (IL-8), Interleukin 9 (IL-9), Interleukin 10 (IL-10), Interleukin 11 (IL-11), Interleukin 12 (IL-12), Interleukin 15 (IL-15), Interferon gamma (IFN- $\gamma$ ), and combinations thereof.

Claim 197. (New): The method of claim 195, wherein the growth factor is selected from the group consisting of members of the epithelial growth factor family, members of the fibroblast growth factor family, Stem Cell Factor, granulocyte colony stimulating factor (G-CSF), keratinocyte growth factor (KGF), granulocyte-macrophage colony stimulating factor (GM-CSF), insulin-like growth factor-1 (IGF-1), a growth hormone, a thyroid hormone, M-CSF, Meg-CSF, MIF, LIF, TNF, PDGF, B cell growth factor, B cell differentiation factor, eosinophil differentiation factor, and combinations thereof.

Claim 198. (New): A method of increasing the functionality of immune cells of a patient, comprising disrupting the sex steroid-mediated signaling in the patient, wherein the immune cell functionality is increased without reactivation of the patient's thymus, compared to the functionality of immune cells of the patient prior to disruption of sex steroid-mediated signaling.

Claim 199. (New): The method of claim 198, wherein the functionality of immune cells of the patient is selected from the group consisting of killing of target cells; lymphocyte proliferative response; signaling ability; homing ability; APC activation; levels or activity of receptors, cell adhesion molecules, or co-stimulatory molecules; apoptosis; release of cytokines, interleukins, and other growth factors; levels of antibody in the plasma; increased levels of innate immunity in the blood and body; and combinations thereof.

Claim 200. (New): The method of claim 198, wherein the immune cells are selected from the group consisting of T cells, B cells, and dendritic cells.

Claim 201. (New): The method of claim 200, wherein the immune cells are T cells.

Claim 202. (New): The method of claim 198, wherein the sex steroid-mediated signaling is disrupted by surgical castration or chemical castration.

Claim 203. (New): The method of claim 198, wherein the sex steroid-mediated signaling is disrupted by administration of a pharmaceutical.

Claim 204. (New): The method of claim 203, wherein the pharmaceutical is selected from the group consisting of an LHRH agonist, an LHRH antagonist, an anti-LHRH vaccine, an anti-androgen, an anti-estrogen, a SERM, a SARM, a SPRM, an ERD, an aromatase inhibitor, an anti-progestogen, a progestins, an anti-progestin, an adrenal gland blocker, an aldosterone antagonist, a dioxalan derivatives, and combinations thereof.

Claim 205. (New): The method of claim 204, wherein the LHRH agonist is selected from the group consisting of Goserelin, Leuprolide, Triptorelin, Meterelin, Buserelin, Histrelin, Nafarelin, Lutrelin, Leuprorelin, Deslorelin, Cystorelin, Decapeptyl, Gonadorelin, and combinations thereof.

Claim 206. (New): The method of claim 204, wherein the LHRH antagonist is selected from the group consisting of Abarelix, Cetrorelix, acetates, citrates, and other salts thereof, and combinations thereof.

Claim 207. (New): The method of claim 204, wherein the anti-androgen is selected from the group consisting of Cosudex®, bicalutamide, cyproterone acetate, liarozole, ketoconazole, flutamide, megestrol acetate, dutasteride, finasteride, Eulexin, and combinations thereof.

Claim 208. (New): The method of claim 198, wherein the thymus of the patient is at least in part atrophied.

Claim 209. (New): The method of claim 198, wherein the patient has a disease or illness that at least in part atrophied the thymus of the patient.

Claim 210. (New): The method of claim 198, wherein the patient has had a treatment of a disease or illness that at least in part atrophied the thymus of the patient.

Claim 211. (New): The method of claim 210, wherein the treatment is immunosuppression, chemotherapy, or radiation treatment.

Claim 212. (New): The method of claim 198, wherein the patient is post-pubertal.

Claim 213. (New): The method of claim 212, further comprising administering to the patient cells selected from the group consisting of stem cells, progenitor cells, dendritic cells, and combinations thereof.

Claim 214. (New): The method of claim 213, wherein the stem cells are selected from the group consisting of HSC, epithelial stem cells, and combinations thereof.

Claim 215. (New): The method of claim 213, wherein the progenitor cells are selected from the group consisting of lymphoid progenitor cells, myeloid progenitor cells, and combinations thereof.

Claim 216. (New): The method of claim 213, wherein the stem cells are HSC.

Claim 217. (New): The method of claim 216, wherein the HSC are CD34<sup>+</sup>.

Claim 218. (New): The method of claim 213, wherein the cells are autologous.

Claim 219. (New): The method of claim 213, wherein the cells are not autologous.

Claim 220. (New): The method of claim 216, wherein the HSC are administered at the time disruption of sex steroid-mediated signaling is begun.